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Musa kamengensis (Musaceae), a New Species from Arunachal Pradesh, India

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A new wild species of banana *Musa kamengensis* Gogoi & Häkkinen, is described and illustrated. The species is abundant in a 250 sq. km area from Jamiri, Zero point to Kimi point along Sepa Road in West Kameng, Arunachal Pradesh, India. A key to the closely related species is provided.

Key words: Arunachal Pradesh, *Musa, Musa kamengensis*, West Kameng, wild banana

Musa L., the largest genus of *Musaceae* Juss. contains about 70 species (Häkkinen 2013). The remaining two genera are *Ensete* Horan. and *Musella* (Franch.) C. W. Wu. The taxonomy of *Musa* has been complicated by a paucity of specimens and the difficulty in preparing herbarium specimens. The polyploid nature of the cultivars further complicates the situation.

Southeast Asia, with more than half of the species of *Musa*, is the major center of origin and evolution of *Musa*. Within that center northeast India is one of the micro centers of evolution of wild Banana. Arunachal Pradesh, the northeastern-most state of India harbors the highest number of wild species. In December 2012, on an expedition to West Kameng district, Arunachal Pradesh, one of us (Gogoi) collected an interesting species of *Musa* that could not be identified using the works of Champion (1967), Cheesman (1947, 1949), Cheesman & Larter (1935), Liu *et al.* (2002), Lý *et al.* (2012), Pollefeys *et al.* (2004), Sealy (1956), Shepherd (1999), Simmonds (1956, 1960, 1962, 1966), Singh *et. al.* (2001), Uma (2006), Uma *et. al.* (2006) or Valmayor (2001, 2002). We here describe it as *M. kamengensis* (*Musa* section *Musa*).

Based on extensive field observations by Gogoi during the December 2012 expedition, the description of the new species was prepared in the field following the approach Simmonds (1962, 1966).

Taxonomy

Musa kamengensis Gogoi & Häkkinen, **sp. nov.** —Figs. 1 & 2.

Musa kamengensis is similar to *M. sikkimensis* Kurz, but differs in having an erect to horizontal inflorescence, carpellate and staminate bracts pink, fruit pointing toward staminate bud and more seeds per fruit (to 133 seeds as compared to 65 seeds in *M. sikkimensis*).

Typus: INDIA. Arunachal Pradesh, West Kameng District, Zero point to Kimi point, Sepa Road, 1000–1200 m, 24 December 2012, *R. Gogoi 21983* (holo- CAL; iso- ARUN, ASSAM).

Plants suckering freely; suckers 2–8, vertical. Mature pseudostem to 4.25 m tall, to 13 cm in diam. at base, covered with dead remains of older sheaths. **Sheaths** green with reddish or blackish patches, underlying color shiny green, non-waxy;

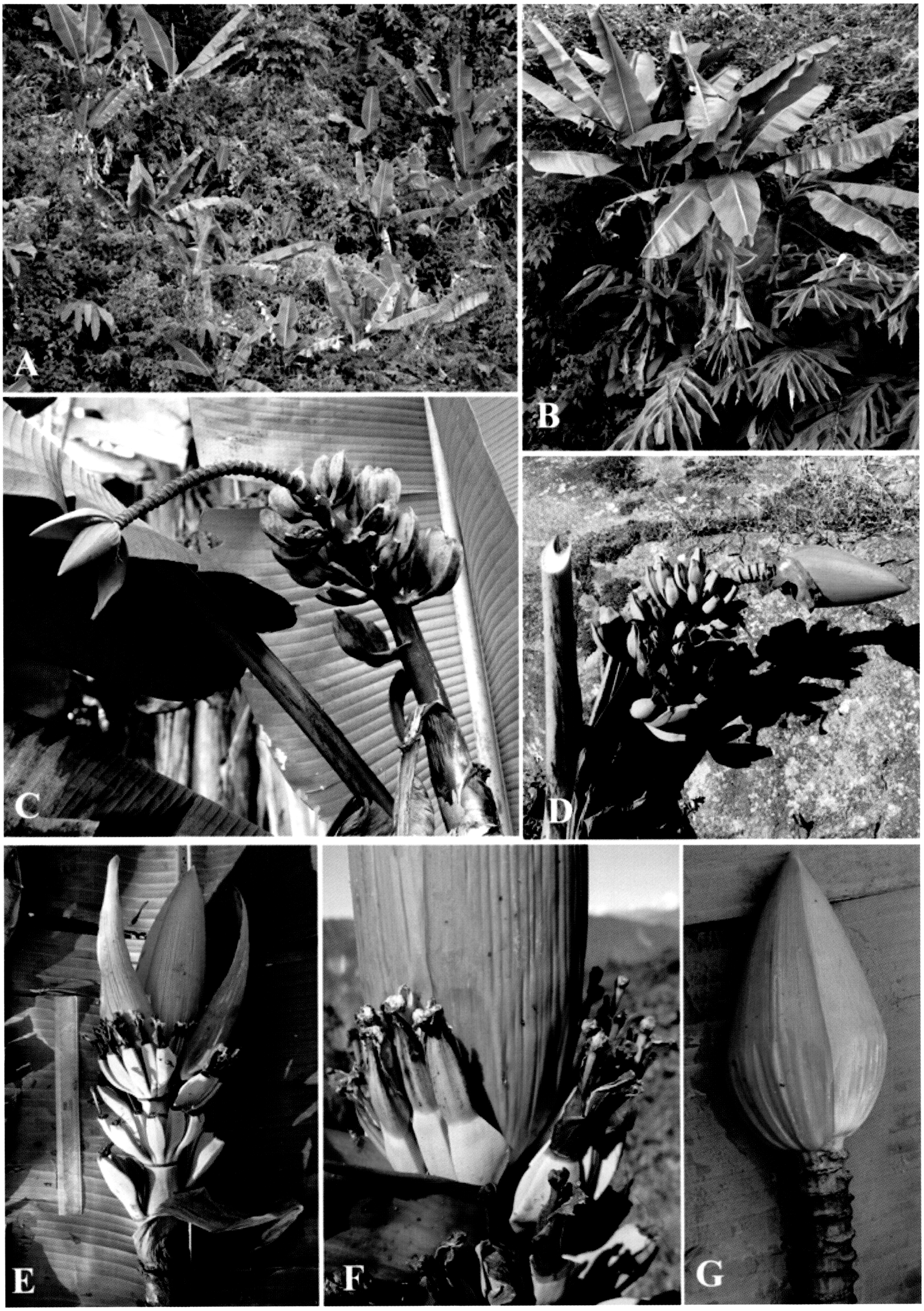

FIG. 1. *Musa kamengensis* Gogoi & Häkkinen. A. Natural population. B: A single clump. C: Fruiting plant. D: Immature fruiting bunch with staminate bud. E: Carpellate bud. F: Close view of carpellate flowers. G. Staminate bud.

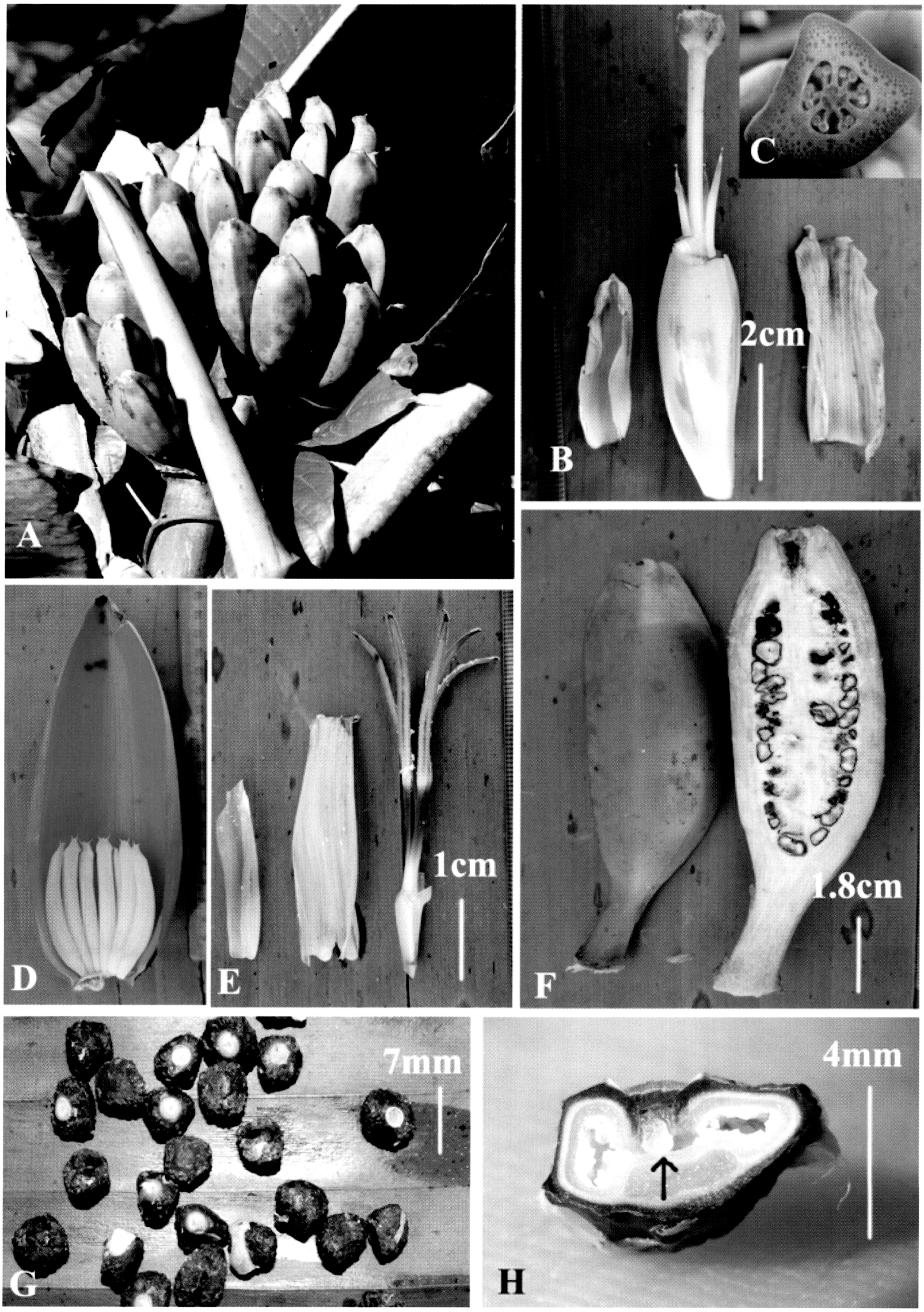

FIG. 2. Reproductive characters of *Musa kamengensis* Gogoi & Häkkinen. A: Mature fruiting bunch. B: Dissected parts of basal carpellate flowers. C: Transverse section of ovary showing four rows of ovules in each locule. D: Staminate bracts with flowers. E: Dissected parts of staminate flower. F: Fruit. G: Seeds. H. Longitudinal section of seed showing embryo.

sap watery. **Petiole** 51–57 cm long, to 4 cm in diam., base auricled, wings dry. **Leaves**: lamina elliptic to oblong, 165–235 × 65–87 cm, base slightly asymmetric, one side rounded, one side pointed, apex truncate; abaxially (lower surface) pale or yellowish green, non-waxy, adaxially (upper surface) deep green, shiny, midrib yellowish green, abaxially blackish purple spotted. **Inflorescence** erect, sterile leaf-like bract to 70 cm long, normal sterile bracts 2, to 47 × 9 cm; peduncle 11–21 cm long, to 5 cm in diam., green, pubescent, not waxy, persistent at opening and remaining to maturity of first carpellate flowers. **Carpellate bud** lanceolate, to 25 × 9 cm; bracts pink, not waxy, to 29 × 12 cm, imbricate, apex acute, lifting 2 bracts at a time, not revolute before falling; basal flowers carpellate, 3–9 per bract, 8.5 cm long; ovary 4 cm long, 1.5 cm in diam., prominently ridged, yellowish green; ovules in 4 rows per locule; stigma flat, 6 × 6 mm, grayish; style 3.2 cm long, creamy; compound tepals to 4 × 2 cm, with 2 prominently thickened keels, light yellow, apex deep yellow and curved outward; free tepal to 3.2 × 2, ovate, translucent white, apex acute; staminodes 5, to 1.5 cm long, greenish yellow. **Staminate bud** top shaped, to 18 × 8 cm, bracts pink, not waxy, imbricate, not revolute before falling; staminate flowers averaging 8 per bract, in one row, falling with bracts; compound tepal to 5.2 × 1.7 cm wide, without thickened keels, base light yellow, apex orange; free tepal 3.2 × 1.6 cm wide, translucent white; anthers 5, not inserted, to 4.6 cm long, filaments creamy, to 1.5 cm long, anther lobes pinkish, to 3.2 cm long; ovary to 1 × 0.5 cm, creamy, without additional pigmentation; style to 5 cm long, stigma creamy, 2 mm in diam.; rachis with prominent scars, to 37 cm long, horizontally spreading. **Fruit** bunch erect or ascending, compact, with 4–8 hands; 3–9 fruits in 1 row, appearing as 2 rows when immature; individual fruit straight, to 12 cm long (including pedicel), 3.5 cm in diam., prominently 3–4 ridged, apex obtuse; pedicel 2 cm long, 7 mm in diam., slightly curved, glabrous; immature fruit peel green, not waxy, fruit pulp white; seeds up to 133 per fruit, angular, wrinkled, 3 mm long, 7 mm wide at apex.

Habitat: *Musa kamengensis* is common on mountain slopes of Jamiri at an elevation of 1500 m, the species is widely distributed from Zero point to Kimi point on the Sepa road in West Kameng district, Arunachal Pradesh. The species grows from 800 to 1500 m and thus appears to be cold-tolerant.

Etymology: *Musa kamengensis* is named for the type locality, Kameng.

Notes: *Musa kamengensis* exhibits characteristics of sect. *Musa*, such as the robust pseudostem, large fruit, four rows of ovules per locule, but it also bears some uncommon characteristics, such as the erect to horizontal inflorescence and fruit bunch and pink flower buds. An extensive survey established the existence of large populations in an area of 250 sq. km in West Kameng District, Arunachal Pradesh. In many places the populations forms huge, isolated colonies on subtropical hilly slopes. The high degree of seed set (to 133 seeds per fruit) with viable embryos, leads us to treat these plants as a distinct species and not hybrid. Chromosome numbers were not determined.

Key to *Musa kamengensis* and allied species in India

1a. Mature pseudostem fully covered with dead remains of older sheaths; plants not waxy; fruit in one row in each hand..2
1b. Mature pseudostem naked, not covered with dead remains of older sheaths; plants waxy at least when young; fruit in two rows in each hand..3
2a. Inflorescence erect; carpellate bracts pink; staminate bracts pink; fruit pointing toward the staminate buds ....*M. kamengensis* Gogoi & Häkkinen
2b. Inflorescence pendulous; carpellate bracts reddish or purple; staminate bracts purple, fruit pointing away from the staminate buds....................*M. sikkimensis* Kurz
3a. Pseudostem less than 6 m tall, base not bulbous; carpellate bracts revolute; fruit deep green ....*M. flaviflora* N.W.Simmonds
3b. Pseudostem to 8 m or more, base bulbous; carpellate bracts not revolute; fruit light green or whitish....................4
4a. Underlying color of pseudostem maroon or brownish red; staminate buds lanceolate; staminate bracts deep purple, persistent....................*M. cheesmanii* N.W.Simmonds
4b. Underlying color of pseudostem green; staminate buds ovoid; staminate bracts crimson red, deciduous ....*M. balbisiana* Colla

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References

Champion, J. 1967. Notes et Documents sur les Bananiers et leur Culture. Tome 1, Botanique et Génétique des Bananiers. Editions Setco, Paris.

Cheesman, E. E. & L. N. H. Larter. 1935. Genetical and cytological studies of *Musa* III. Chromosome numbers in the Musaceae. J. Genet. 30: 31–52.

Cheesman, E. E. 1947. Classification of the bananas. II. The genus *Musa* L. Kew Bull. 2: 106–117.

Cheesman, E. E. 1949. Classification of the bananas. III. Critical notes on species. Kew Bull. 3: 265–272.

Häkkinen, M. 2013. Reappraisal of sectional taxonomy in *Musa* (Musaceae). Taxon 62: 809–813.

Liu, A-Z, Li, D-Z & Li X-W. 2002. Taxonomic notes on wild bananas (*Musa*) from China. Bot. Bull. Acad. Sin. 43: 77–81.

Lý, N.-S., C.-K. Le, T.-D. Tried, A. Haevermans, P. P. Lowry II, & T. Haevermans. 2012. A distinctive new species of wild banana (*Musa, Musaceae*) from northern Vietnam. Phytotaxa 75: 33–42

Pollefeys, P., S. Sharrock & E. Arnaud. 2004. Preliminary analysis of the literature on the distribution of wild *Musa* species using MGIS and DIVA-GIS. INIBAP-IPGRI, Quebec.

Sealy, J. R. 1956. The Roxburgh Flora Indica drawings at Kew. Kew Bull. 3: 349–399.

Shepherd, K. 1999. Cytogenetics of the genus *Musa*. INIBP, Montpellier, France.

Singh, H.P., S. Uma, & S. Sathiamoorthy. 2001. A Tentative Key for identification and classification of Indian Bananas. National Research Centre for Banana (ICAR), Tiruchirapalli.

Simmonds, N.W. 1956. Botanical results of the banana collecting expedition 1954–5. Kew Bull. 11: 463–489.

Simmonds, N. W. 1960. Notes on Banana taxonomy. Kew Bull.14: 198–212.

Simmonds, N. W. 1962. The Evolution of Bananas. Longmans, London.

Simmonds, N. W. 1966. Bananas. 2nd ed. Longmans, London.

Uma, S. 2006. Farmer's Knowledge of wild Musa of India. F.A.O, Rome.

Uma, S, M. Saraswathi, P. Durai & S. Sathiamoorthy. 2006. Diversity and distribution of the section *Rhodochlamys* (Genus *Musa*, Musaceae) in India and breeding potential for banana improvement programmes. Plant Genetic Resources Newsletter 146: 17–23.

Valmayor, R. V. 2001. Classification and characterization of *Musa exotica*, *M. alinsanaya* and *M. acuminata* ssp. *errans*. Philipp. Agric. Sci. 84: 325–331.

Valmayor, R. V. 2002. Classification and characterization of *Musella splendida* sp. nov. Philipp. Agric. Sci. 85: 204–209.

Wu, T. L. 1997. Notes on the Lowiaceae, Musaceae, and Zingiberaceae for the flora of

China. Novon 7: 440–442.

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